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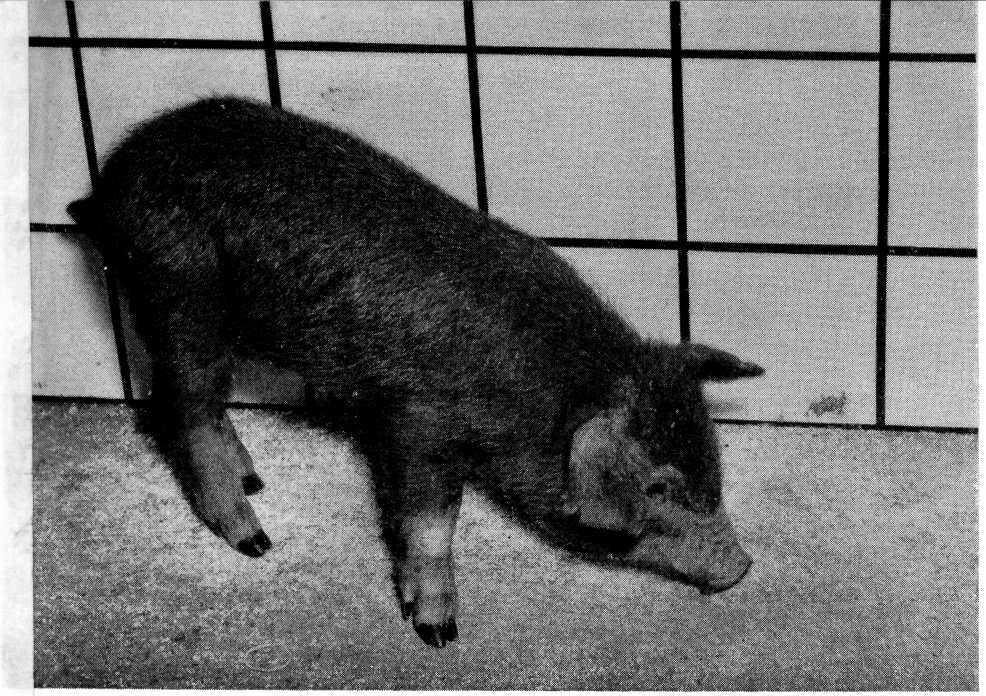

RUNT PIGS CAN BE SAVED

by Damon Catron and Peter Cuff

RUNT PIGS have posed a problem in hoglots ever since farmers started raising hogs. Runts occur even in the hoglots of our best managers. It's been a problem on our swine experimental farms, too.

Now, studies conducted by the Iowa Agricultural Experiment Station have demonstrated that feeding antibiotics, such as aureomycin and terramycin, can give certain runt pigs a new lease on life.

In our tests we've seen antibiotics save scrawny, gaunt pigs with their ribs sticking out and heads and ears appearing proportionally larger than their bodies—weighing less than 20 pounds at 76 days of age. The antibiotics not only saved them, but snapped them out of their "runt" condition so that they made normal daily gains of 1 1/3 pounds during a 10-week feeding period. Similar pigs fed a good ration including skimmilk—the best ration we knew for runt pigs 3 years ago —made less than a pound of gain per day during the same feeding period. Higher mortality and unevenness showed up in pigs not getting the antibiotics.

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What Makes Runts?

What makes a runt? The answer to this question can be summed up in five points.

- ***Poor breeding stock.*** Maybe the pig doesn't have the genetic potentiality to grow fast.
- ***Poor nutrition of sow.*** Perhaps his mother wasn't fed right when he was a developing embryo. So he ended up too small or too weak to compete with his bigger, stronger brothers and sisters.
- ***Poor nutrition followed by disease.*** It could be that everything went fine in the pig's life until his mother was poorly fed during the nursing period. Then he didn't get enough milk or the right nutrients in the milk. He developed nutritional deficiencies, and disease caught up with him.
- ***Disease.*** Even if he was a well-bred, well-fed, properly-managed pig, some diseases such as erysipelas, damage from parasitic infection, irreparable damage from certain types of enteric disorders or transmissible gastroenteritis could stunt him, if he survived.
- ***Poor management.*** Maybe his mother was turned in with too many other sows, and their pigs made a mad scramble for his dinner plate when the chow time call was given. Or perhaps he picked up too many roundworm eggs and mange mites in dirty hoglots.

Many factors can produce runts. So success in making profitable hogs out of runts depends upon getting at the causes.

The first experiment with runt pigs was set up in the fall and winter of 1949-50. For many years we've been aware of this problem on farms, and on our experimental farms. Too, we had a hunch something could be done about it through better nutrition.

Farm Problem

The problem sizes up on farms something like this: Over the country as a whole, there are an average of 1 to 1½ runts per litter. You can get an idea of what runts cost you by considering the fact that, at present prices, you have about $5.88 invested in every pig the day it's farrowed and $10 when it's weaned. These estimates are based on corn selling for $1.54 and supplement $5.50 per hundredweight. They also are based on the state average of 6½ pigs saved per litter and the fact that feed represents about 80 percent of the total cost of swine production.

Runt pigs generally receive one of two treatments. Farmers either "knock 'em in the head" at the start, or baby them along on skimmilk. If they choose the latter, it may merely postpone loss of the pig—resulting in a greater financial loss in terms of investment in feed, housing, labor and management.

The hunch that better nutrition might help solve the runt pig problem was based on observations of earlier studies here and at Michigan. Michigan found that injecting and feeding B-vitamins increased daily gains and improved the feed efficiency of slow-growing pigs suffering from nutritional enteritis due to a previous deficiency of B-vitamins in their rations. In previous work here, we observed that certain APF concentrates tended to make the little pigs catch up with the big ones. These APF concentrates contained both vitamin B_{12} and antibiotic residues.

What We Did

In our first experiment, 32 runt pigs averaging 20 pounds at 71 to 76 days of age were divided into

four lots. Pigs were distributed as evenly as possible in respect to size, sex, appearance and rations fed their mothers during gestation and lactation.

The pigs were typical runts. They had rough hair coats and pot bellies. Their ribs stuck out. Their heads and ears appeared larger than their bodies, and they were tucked up in the rear flanks. These pigs were gaunt; many were scouring.

All pigs on test were wormed with sodium fluoride and sprayed with benzene hexachloride to help rule out the possibility of internal or external parasite interference. Their dams had received these same treatments prior to farrowing.

In this experiment, all pigs received the same basal ration. Based on past feeding standards, it contained the nutrients needed to do a good job with normal, healthy pigs.

TABLE 1

Results of First "Runt" Pig Experiment

(Experiment 478, winter 1949-50. Fed for 62 days on concrete drylot.)

Lot	Treatment	No.[1] pigs finishing	Av. daily gain (pounds)	Av. daily feed (pounds)	Feed per 100 pounds gain (pounds)
	(8 pigs started per lot; average weight per pig, 20 pounds)				
I	Basal ration Ground yellow corn 5-percent meat and bone scraps Expeller soybean oilmeal 2.5-percent dehydrated alfalfa meal Vitamin A and D_2 premix Minerals (including trace minerals)	4	0.46	1.32	346
Basal ration plus:					
II	Liquid skimmilk (full-fed 2 times daily)	7	0.60	1.66	290
III	B-vitamins (injected and fed)	6	0.70	2.00	294
IV	B-vitamins (injected and fed) and 1-percent APF supplement (Lot 26)[2]	8	1.16**	3.27	281

[1] Average final weight per pig by lots (pounds): I-47; II-57; III-63; IV-92.
[2] Lederle APF (Lot 26) contained 2 milligrams vitamin B_{12} and 2.3 grams aureomycin per pound.
** Significantly faster gains (P=.01).

We tried to build a ration similar to that fed by the so-called average Midwest farmer. The ration was made up of ground yellow corn, meat and bone scraps, soybean oilmeal, dehydrated alfalfa meal, vitamin A and D_2 premix, and minerals including trace minerals, iron, copper, cobalt, manganese, zinc and iodine. The average hog feeder might not have fed the vitamin A and D or trace minerals. But we wanted to rule these out as possible deficiencies in the ration.

Lot I received the basal ration alone. Lot II was fed liquid, pasteurized skimmilk twice a day in addition to the basal. Lot III got the basal ration plus B-vitamins injected once at the beginning and then fed continuously. Lot IV received the basal ration plus B-vitamins injected and fed and an APF supplement containing vitamin B_{12} and aureomycin. The B-vitamins injected were thiamin, riboflavin, niacin, pantothenic acid and pyridoxine. Those fed included only riboflavin, niacin and pantothenic acid.

What We Found

Table 1 shows the results after an 8-week feeding period. Lot IV which received the APF supplement containing vitamin B_{12} and aureomycin, made significantly faster gains on less feed than any of the other lots. It was the only lot which finished with all of the eight pigs started. Four pigs died in Lot I, one died in Lot II, and two died in Lot III.

Pigs getting the B-vitamins plus the APF supplement (Lot IV) gained 2.5 times faster than Lot I—nearly twice as fast as Lot II, and 1.6 times faster than Lot III. Lot IV produced 100 pounds of pork on 65 pounds less feed than Lot I, 9 pounds less feed than Lot II, and 13 pounds less feed than Lot III.

Double Check

We set up the second experiment to check the results of the first. Also, we wanted to nail down whether it was vitamin B_{12} or aureomycin in the APF supplement that did the job.

Seventy-two runt pigs, averaging 21 pounds at 72 days of age, were divided into 9 lots. They were similar to the pigs in the first experiment—possibly a little better pigs. The same basal ration was fed except that the alfalfa meal and meat and bone scraps levels were doubled. This would be equivalent to a farmer feeding a supplement made up of a least 50 percent meat and bone scraps.

Here's how the pigs were fed: Lot I got the basal ration only; Lot II—basal plus pasteurized skimmilk fed twice daily; Lot III—basal plus B-vitamins injected and fed; Lot IV—basal plus B-vitamins and an APF supplement containing vitamin B_{12} and terramycin; Lot V—basal plus B-vitamins, the APF supplement and thyroprotein; Lot VI—the

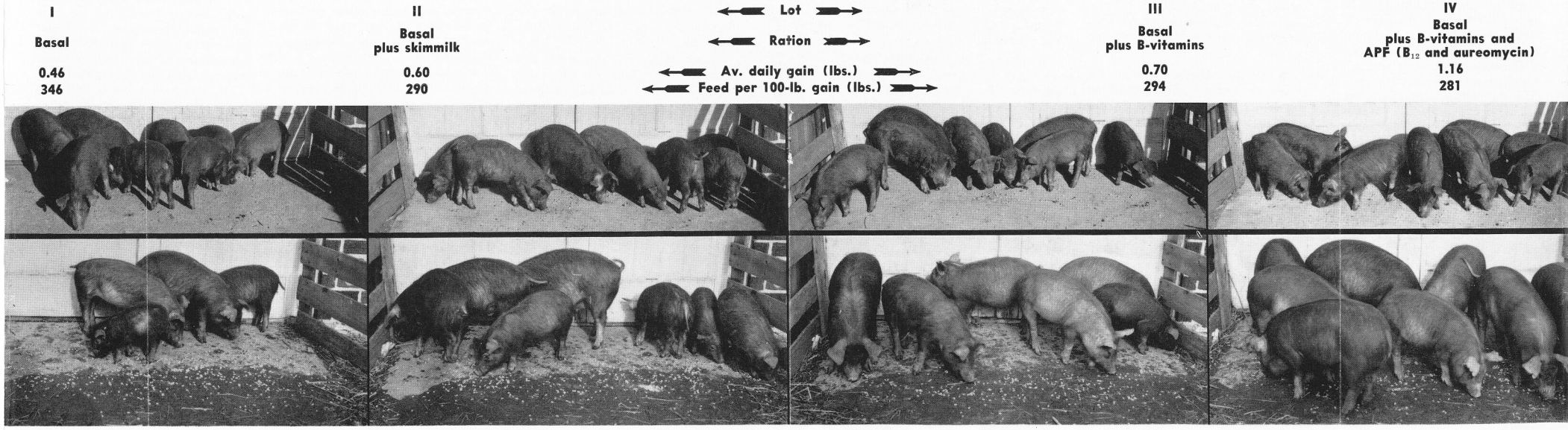
TABLE 2

Results of Second "Runt" Pig Experiment

(Experiment 492, summer 1950. Fed for 70 days on concrete drylot.)

Lot	Treatment	No.[1] pigs finishing	Av. daily gain (pounds)	Av. daily feed (pounds)	Feed per 100 pounds gain (pounds)
	(8 pigs started per lot; average weight per pig, 21 pounds)				
I	Basal ration Ground yellow corn 10-percent meat and bone scraps Solvent soybean oilmeal 5-percent dehydrated alfalfa meal Vitamin A and D_2 premix Minerals (including trace minerals)	7	0.86	5.34	308
Basal ration plus:					
II	Liquid skimmilk (full-fed 2 times daily	8	0.94	5.78	308
III	B-vitamins (injected and fed)	8	0.93	4.96	278
IV	B-vitamins (injected and fed) and 1-percent APF supplement[2]	7	1.21*	5.54	290
V	Same as Lot IV plus thyroprotein	6	1.08	5.50	323
VI	1-percent APF supplement[2]	7	1.14	5.54	286
VII	Vitamin B_{12} (10 micrograms per pound of ration)	6	0.70	5.56	343
VIII	Aureomycin (20 milligrams per pound of ration)	7	1.33**	5.64	279
IX	Aureomycin (20 milligrams) and vitamin B_{12} (10 micrograms) per pound of ration	8	1.37**	5.93	265

[1] Average final weight per pig by lots (pounds): I-79; II-85; III-85; IV-104; V-95; VI-97; VII-70; VIII-114; IX-114.
[2] APF supplement (Pfizer Bi-Con 3+) containing 3 milligrams Vitamin B_{12} and .5 gram terramycin per pound.
** Significantly faster daily gains (P=.01). * Significantly faster gains (P=.05).



Above are the pigs of table 1. The top pictures are of pigs at the start of the experiment, when they averaged about 20 pounds each—lower pictures show remaining pigs of same lots after 62 days on feed.

basal plus the APF supplement; Lot VII—the basal plus crystalline vitamin B_{12}; Lot VIII—the basal plus aureomycin; and Lot IX—the basal plus crystalline vitamin B_{12} and aureomycin. The B-vitamins in each case were injected once at the beginning, then fed continuously.

We included thyroprotein in the experiment because it causes the thyroid gland to stimulate other glands which secrete hormones. Simply, it makes an animal "burn feed" faster. We thought this might affect the growth of runts.

Table 2 shows that the results of the second trial were about the same as the first. Pigs getting antibiotics, either terramycin contained in the APF supplement or crystalline aureomycin, made faster daily gains. They made the gains on less feed than the other lots of pigs with the exception of the lot receiving the basal ration plus B-vitamins.

What It Means

The second experiment points out that the *antibiotics were the significant factors* in producing faster gains and improving feed efficiency. The best lot of pigs in respect to gains and feed efficiency was Lot IX which got the basal ration plus 10 micrograms of vitamin B_{12} and 20 milligrams of aureomycin per pound of total feed. Next best lot on gains was Lot VIII which received the basal ration plus aureomycin. Feed efficiency of Lot VIII was near the top. Lot IV, which received B-vitamins and an APF supplement containing terramycin and vitamin B_{12}, was third high in daily gains. Lot VI, which got the basal plus the APF supplement, was next in daily gains.

Adding more vitamin B_{12} didn't have much effect on the growth of runt pigs when enough B_{12} was already contributed by 10 percent meat and bone scraps in the basal ration.

There was no significant difference between pigs getting the basal ration and those receiving the basal plus crystalline B_{12}. Pigs getting aureomycin alone made about the same gains as those getting aureomycin and vitamin B_{12}.

Thyroprotein did *not* boost gains on these runts. Lot V, which was fed thyroprotein in addition to the APF and B-vitamins, didn't gain as well as Lot IV which was fed B-vitamins plus the APF without thyroprotein. Apparently these runts were not runts because of insufficient thyroid hormone production.

B-vitamins alone had little effect in the second experiment. They increased daily gains by less than 0.1 pound over the basal ration—about equal to skimmilk. Comparing Lots IV and VI, B-vitamins added to the APF supplement also increased gains by a little less than 0.1 pound per day. This indicates that these pigs were not "poor doers" because of a lack of B-vitamins. Apparently the 5-percent dehydrated alfalfa meal in the basal ration contributed enough B-vitamins.

At a glance, aureomycin appears to be better than terramycin. However, they were fed at different levels. Not quite half as much terramycin was fed in the APF supplement as was fed in the lots receiving crystalline aureomycin.

How and Where

How do antibiotics work? There are many theories on what happens inside a pig when antibiotics are fed. Here are two of the most commonly accepted theories:

- One theory is that the antibiotic suppresses harmful organisms inside the intestinal tract. These organisms may cause pigs to scour or produce toxins which retard pig growth.

- Another theory is that the antibiotic reduces the competition between the organisms and the pig for nutrients in the ration. Antibiotics may do this by "sparing" or making available more nutrients to the pig.

Where can you get antibiotics? It's not practical to buy them at the drug store for feeding hogs. Right now, at the drug store, it'll cost you about $24 extra per ton of ration.

What were known earlier as APF feeding supplements are now known to consist of vitamin B_{12} and in some cases an antibiotic. Therefore feed-control officials have agreed to drop the term APF and refer to them as B_{12} supplements, antibiotic supplements or a combination. You can get antibiotics by buying a balanced creep ration or supplement containing vitamin B_{12} and antibiotics. Or you can purchase an APF-vitamin premix, containing vitamins and antibiotics and have it mixed well with the other ingredients in your ration.

On Your Farm

How can you apply this information to your feedlot?

- Select good breeding stock. Some runts are runts because they've inherited slow-growth characteristics.

- Feed sows a good gestation ration containing adequate levels of protein, vitamins and minerals along with your home-grown grain.

- Feed sows a balanced sow and pig supplement during lactation, and creep-feed nursing pigs a balanced ration.

- Pen litters according to age so older pigs won't rob the younger pigs.

- Control external and internal parasites and disease as best you know how.

- If, in spite of your breeding, feeding and management program, you still have a few runts, pen them separately. Purchase, or have mixed, a highly-fortified ration including extra antibiotics and vitamin B_{12}, and high levels of other essential vitamins such as riboflavin, niacin and pantothenic acid.

If pigs have poor appetites, have your local veterinarian inject the B-vitamins. B-vitamins stimulate the appetite so a pig will get back on feed. Then he'll get the B-vitamins and other essential nutrients from the ration.

While the experimental work shows that feeding skimmilk alone isn't a satisfactory method of correcting a runt pig problem it doesn't mean you shouldn't feed it. If skimmilk is available, feed it along with a well-balanced ration containing antibiotics.

Good hog men know that it's better to follow proven swine production practices that help prevent runts than attempt to make profitable hogs out of runts. However, the application of the findings of this research may mean dollars and cents in the pockets of swine producers who have runt pigs.